

gave full and ample warnings of Tuesday night's gale which swept over the lakes with such sad results to life and property. There can be no doubt but that this one warning alone has repaid the country for the outlay of the entire annual appropriation granted by Congress for the maintenance of the service. Too much credit can not be given to the Chief of the Weather Bureau and the officers in charge of lake stations for the energetic and well advised measures taken to warn vessels of the approach of the late gale and its probable severity.

Editorial from the Inter-Ocean, Chicago, Ill., September 14, 1900.

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Simple justice demands public recognition of the efficiency of the Chief of the Meteorological Bureau and his staff. They have demonstrated their usefulness in such manner as to set at rest all doubt with regard to the wisdom the Government has displayed in maintaining the weather service against all opposition and all ignorant prejudices.

The heated period which prevailed almost continuously over the eastern part of the United States during July and August was permanently broken by the tropical storm described herein, and advices to this effect were given in a special bulletin which was issued the morning of September 12, 1900.

From the 15th to the 18th a cool wave, which produced the first frost of the season, extended from the Northwestern States over the Lake region, and frost occurred in the Northwestern States from the 25th to the 27th. Warnings of these frosts were distributed over the districts visited. In the north Pacific coast States the occurrence of frost on the 19th, 24th, 25th, 27th, and 28th was, as a rule, predicted.

On the 23d and 24th snow fell in the mountains and hills about Salt Lake City, Utah. The Weather Bureau observer at Cheyenne, Wyo., reports that snow fell as far west as Evanston, and that a depth of 13 inches was measured at Sherman the morning of the 25th. On the 24th railroad contractors working on a big contract on Sherman Hill were specially informed by the Weather Bureau observer at Cheyenne of the approaching storm.

Toward the close of the month damage was caused by a rapid rise in the Colorado, Brazos, and Trinity rivers, Texas. Towns on the Colorado, south of Austin, were warned of the impending flood, and the inhabitants of the bottom lands of the Trinity were warned in time to escape. Interests along the Brazos River were also warned, on the 27th, that the rise would continue during the next few days and overflow low land.

CHICAGO FORECAST DISTRICT.

The principal meteorological feature was the passage of the Galveston storm across the lakes. On the morning of the 11th this storm was central over Iowa, and its characteristics were such that it was deemed advisable to at once send storm warnings to upper lake ports. The warnings were made especially strong because lake captains do not expect severe storms during the month of September, and stated that "the storm would be dangerous for practically all vessels to leave port."

The great force of the storm was not felt on Lake Superior, but it was not deemed advisable to take any chances on the direction of the storm's movement, and consequently all ports received equal warnings. Some of the lake stations reported higher wind velocities than any reported previously for several years, and the fact that few wrecks and casualties occurred was undoubtedly due to the advices issued by the Weather Bureau.

A storm of considerable energy moved eastward across the upper Lake region during the 15th and 16th. On the 15th warnings for this storm were ordered at all upper lake ports, except at Chicago and Milwaukee.

A general frost condition moved from the extreme northwest over the upper Mississippi Valley and the western Lake region from the 15th to the 18th. As this was the first frost

of the season, the warnings were probably of great value. Frost warnings were also issued on the 25th, 26th, and 27th, in advance of frost which occurred in the Northwest and the northern Lake region.—*H. J. Cox, Professor of Meteorology.*

SAN FRANCISCO FORECAST DISTRICT.

No special forecasts or warnings were issued during the month.—*G. H. Willson, Local Forecast Official.*

PORTLAND, OREG., FORECAST DISTRICT.

The only storm during the month attended by high winds passed over the northern portion of the district on the 22d.

The storm struck the Gulf of Georgia with great violence and several small steamboats were capsized and sunk and their occupants were undoubtedly drowned. A dispatch from Tacoma says: "Steamboat men all say that the storm last night was the worst for many years, and the little damage done to shipping was due to danger warnings being displayed foretelling the storm." Frosts occurred on the 19th, 24th, 25th, 27th, and 28th, which were generally forecast.—*A. B. Wollaber, Acting Forecast Official.*

HAVANA, CUBA, FORECAST DISTRICT.

Stations in Cuba, Jamaica, Haiti, Turks Island, Santo Domingo, and Porto Rico and shipping interests were fully informed of the location, character, and course of the tropical storm which moved westward over the Caribbean Sea during the first three days of September and crossed northward over the western central part of Cuba during the 4th. The storm was not severe in the West Indies although the rains were, in places, torrential. At Santiago, Cuba 24.34 inches of rain fell from 8 a. m. of the 3d to 8 p. m. of the 7th, of which amount 12.58 inches fell in the twenty-four hours ending 8 a. m. of the 4th.—*W. B. Stockman, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

During the month there were nine highs and nine lows with sufficiently definite progressive movement to admit of their being charted. (See Charts I and II.) A brief description of their movements and more prominent characteristics follows herewith:

Highs.—It is particularly worthy of mention that none of the highs moved south of the thirty-ninth parallel except a minor offshoot of the one charted as No. VII. All except Nos. I, VI, VII, and the smaller section of No. IX originated in the Province of Alberta, N. W. T. Nos. III, IV, and IX moved almost directly eastward over Canada to the Atlantic Ocean. No. IX was joined over central Ontario by another section which had moved up from central Illinois. Nos. II and VIII also moved eastward over Canada, first taking a southeasterly course through the Dakotas, and thence easterly. No. I originated on the north Pacific coast, moved southeastward to Nebraska, and thence eastward to the southern New England coast, making on the way a detour through the Lake region. No. VI moved along the Pacific coast from northern California through Washington. No. VII originated in Wyoming, moved eastward to the upper Ohio Valley, then turned sharply northward to Ontario, again eastward to the Maine coast, and finally northeastward into the Atlantic by way of St. Johns, N. F.

During the earlier days of the month a high area also set-